

INSTALLATION INSTRUCTIONS

Original Issue Date: 7/92

Model: 33-45 kW (CSG-649 Ford-Powered)

Market: Standby

Subject: Engine Block Heater Kits: PA-276378/PA-276378-SD (120 Volt) and PA-276379/PA-276379-SD (240 Volt)

The engine block heater kit heats engine coolant, making starting easier and warm-up quicker. The thermostat will automatically turn off the heater when coolant temperature reaches 120°F (49°C).



**Accidental starting.
Can cause severe injury or death.**

Disconnect battery cables before working on generator set (negative lead first and reconnect it last).

Accidental starting can cause severe injury or death. Turn generator set master switch to OFF position, disconnect power to battery charger, and remove battery cables (remove negative lead first and reconnect it last) to disable generator set before working on any equipment connected to generator set. The generator set can be started by automatic transfer switch or remote start/stop switch unless these precautions are followed.

WARNING	
<p>Hazardous voltage.</p>	<p>Moving rotor.</p>
<p>Can cause severe injury or death.</p>	
<p>Do not operate generator set without all guards and electrical enclosures in place.</p>	

Hazardous voltage can cause severe injury or death. Whenever electricity is present, there is the hazard of electrocution. Open main circuit breaker on all power sources before servicing equipment. Electrically ground the generator set and electrical circuits when in use. Never come into contact with electrical leads or appliances when standing in water or on wet ground, as the chance of electrocution is increased under such conditions.

Hazardous voltage can cause severe injury or death. Engine block heater can cause electrical shock. Remove engine block heater plug from electrical outlet before working on block heater electrical connections.

WARNING
<p>Hot coolant and steam. Can cause severe injury or death.</p>
<p>Before removing pressure cap, stop generator set and allow it to cool. Then loosen pressure cap to relieve pressure.</p>

Hot coolant can cause severe injury or death. Allow engine to cool and release pressure from cooling system before opening pressure cap. To release pressure, cover the pressure cap with a thick cloth; then slowly turn it counterclockwise to the first stop. Remove cap after pressure has been completely released and the engine has cooled. Check coolant level at tank if generator set is equipped with a coolant recovery tank.

NOTE

Pay special attention to the coolant level. After the coolant has been drained, some time is required before complete refill of the engine water jacket takes place.

NOTE

Do not turn on block heater before filling cooling system. Run engine until warm and refill radiator to purge air from the system before energizing block heater. Block heater failure occurs if heater element is not immersed in water.

INSTALLATION

1. Place generator master switch in OFF position. Disconnect battery of generator set, negative lead first. Disconnect battery charger leads, if equipped.
2. With generator set cooled, drain the coolant into a suitable container.

NOTE

Petcock valve is located on radiator bottom and/or engine bottom.

3. Locate sensor block at rear of engine as viewed from generator end. Remove pipe plug. See Figure 1, View A-A for location. Pipe plug will not be reused. Apply pipe sealant to one end of pipe nipple (X-209-18) and install in sensor block.
4. Apply pipe sealant to the other end of pipe nipple and install pipe elbow (X-215-1). Rotate pipe elbow to the 3 o'clock position as viewed from the generator end.
5. Apply pipe sealant to hose connector (X-582-1) and install in pipe elbow.
6. Locate freeze plug on right side of engine for hose connection. Remove freeze plug using a freeze plug puller. Otherwise puncture the center with a punch and pry out plug. Clean hose and remove any burrs. Be careful not to damage sealing surface.
7. With components clean and dry, apply Loctite® threadlocker 272 (red) or equivalent to freeze plug adapter (276215) and hole. Install freeze plug adapter using a hardwood dowel and hammer. Drive freeze plug adapter into the engine block so that it is flush with the outside surface of the engine block. Do NOT drive freeze plug adapter beyond that point or it may be forced into the water jacket. Install reducer bushing (153659) into freeze plug adapter. Torque reducer bushing to 15 ft. lbs. (20 Nm). See Figure 1, View C-C.
8. Coat one end of pipe nipple (X-209-11) with pipe sealant and install into reducer bushing. Torque pipe nipple to 15 ft. lbs. (20 Nm). See Figure 1, View C-C.

9. Coat the other end of pipe nipple with pipe sealant and attach pipe elbow (X-215-1). Rotate pipe elbow to the downward position.
10. Apply pipe sealant to hose connector (X-582-1) and install in pipe elbow.
11. Attach block heater bracket (275588) to generator set skid using two screws (X-465-7), flat washers (X-25-40), and whiz nuts (X-6210-2). See Figure 1 for location.

NOTE

Early generator sets may not have predrilled holes in skid. Use bracket as a template and drill two 19/64 in. (7.5 mm) dia. holes. Locate holes 36.75 in. (933 mm) from end of skid. Center-to-center dimension is 1 3/4 in. (44 mm).

12. Attach block heater (276691 or 276692) to block heater bracket using two screws (X-465-7), flat washers (X-25-40), and whiz nuts (X-6210-2).
13. Place insulating clamp (X-672-3) over hose (X-312-18) and then place hose clamps (X-426-10) on each end of hose. Attach one end of hose to hose connector at sensor block and the other end of hose to block heater outlet. Locate hose clamps 1/4 in. (6 mm) from end of hose and tighten. Use existing starter motor screw to attach insulating clamp.
14. Place insulating clamp (X-672-3) over hose (X-312-18) and then place hose clamps (X-426-10) on each end of hose. Attach one end of hose to hose connector at engine block and the other end of hose to block heater inlet. Locate hose clamps 1/4 in. (6 mm) from end of hose and tighten.
15. Locate freeze plug on right side of engine for thermostat connection. Remove freeze plug using a freeze plug puller. Otherwise puncture the center with a punch and pry out plug. Clean hose and remove any burrs. Be careful not to damage sealing surface.
16. With components clean and dry, apply Loctite® threadlocker 272 (red) or equivalent to freeze plug adapter (276215) and hole. Install freeze plug adapter using a hardwood dowel and hammer. Drive freeze plug adapter into the engine block so that it is flush with the outside surface of the engine block. Do NOT drive freeze plug adapter beyond that point or it may be forced into the water jacket. Install reducer bushing (153659) into freeze plug adapter. Torque reducer bushing to 15 ft. lbs. (20 Nm). See Figure 1, Detail B.

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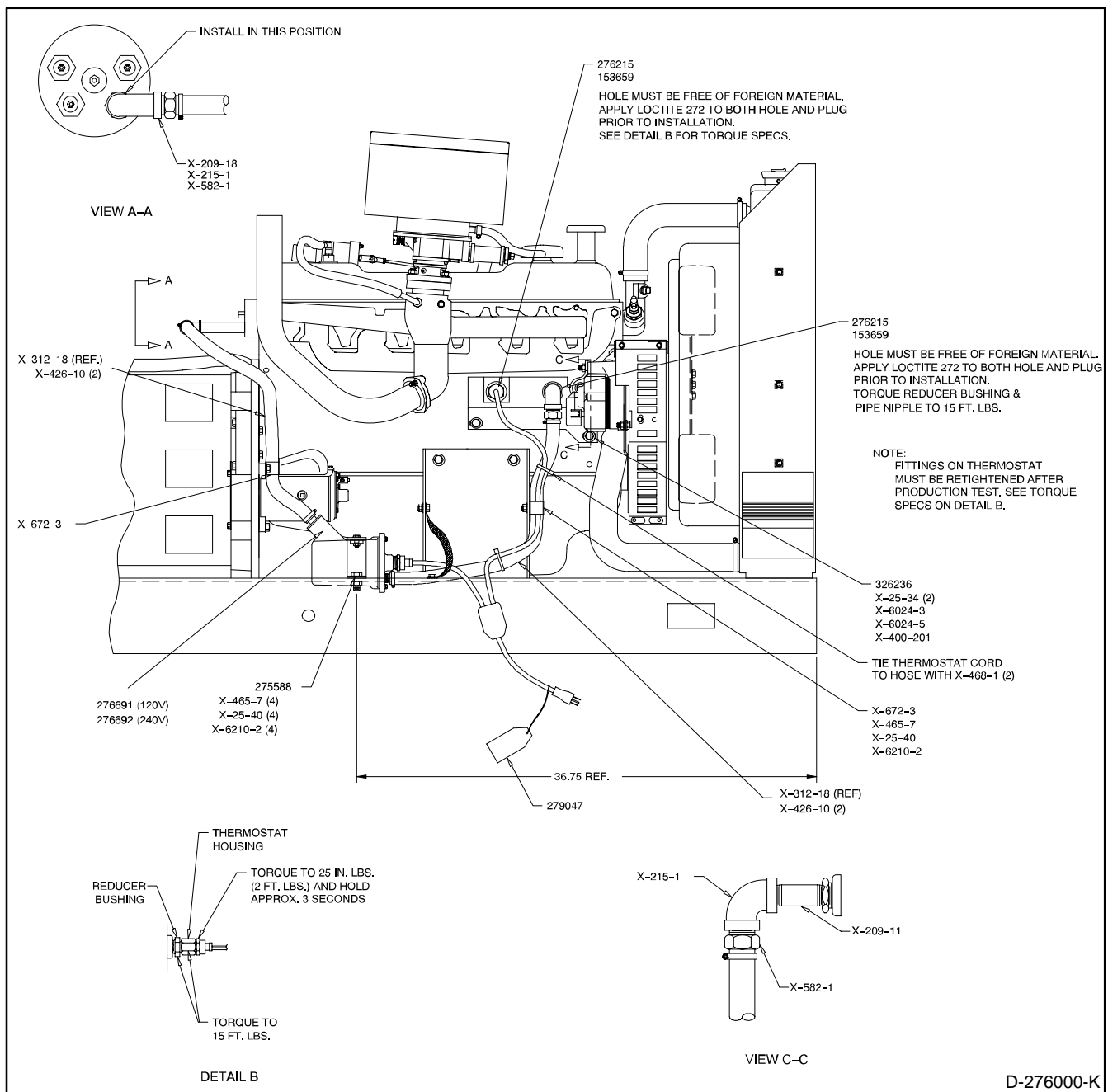


Figure 1. Block Heater Installation

17. Disconnect thermostat housing nut and cord from thermostat housing. Install block heater thermostat housing in reducer bushing and torque thermostat housing to 15 ft. lbs. (20 Nm). Attach thermostat housing nut and cord to thermostat housing. Torque thermostat housing nut to 2 ft. lbs. (2.8 Nm) and hold for approximately 3 seconds. See Figure 1, Detail B.
18. Place thermostat cord through insulating clamp used in step 14. Attach insulating clamp to engine mount using one screw (X-465-7), flat washer (X-25-40), and whiz nut (X-6210-2).
19. Use cable ties (X-468-1) to secure thermostat cord to hose.
20. Attach electrical cord to block heater if not already attached.
21. Attach heat shield (326236) using screw (X-6024-3), screw (X-6024-5), two flat washers (X-25-34), and spacer (X-400-201).
22. Use cable ties (not supplied) as necessary to secure wiring and protect it from being damaged by sharp objects, exhaust system, and any moving parts.
23. Close petcock valves on radiator and/or engine block. Open air bleed valve located on the right side of engine block if equipped.
24. Fill cooling system with fresh coolant. Use a solution of 50% ethylene glycol and 50% clean, softened water to inhibit rust/corrosion and provide freezing protection. See Figure 2. Close air bleed valve.

NOTE

Using a coolant mixture exceeding 50% ethylene glycol may cause block heater element failure. Failing to bleed all the air from the cooling system may cause block heater element failure.

Models	Standard Radiator	Remote Radiator	City-Water Cooled
All	7.6 gal. (29.0 L)	6.25 gal. (23.7 L)	4.0 gal. (15.0 L)

Figure 2. Coolant Capacities

NOTE

Capacities shown may vary from model to model and are subject to change.

25. Check that the generator master switch is in the OFF position. Reconnect battery, negative lead last. Reconnect battery charger if equipped.
26. Test run the generator set for a few minutes to check for leaks and to insure that all air is purged from the system.

NOTE

Engine Damage! Failure to bleed air from cooling system may cause overheating and subsequent damage to engine.

27. Connect block heater electrical plug to corresponding voltage outlet. Attach hang tag (279047) to electrical cord coming from block heater.

NOTE

Do not turn on block heater before filling cooling system. Run engine until warm and refill radiator to purge air from the system before energizing block heater. Block heater failure occurs if heater element is not immersed in water.

NOTE

Pay special attention to the coolant level. After the coolant has been drained, some time is required before complete refill of the engine water jacket takes place.

Parts List

**KITS PA-276378, PA-276378-SD,
PA-276379, PA-276379-SD**

Qty.	Description	Part Number
1	Nipple, 1/2 NPTF x 3 in. pipe	X-209-11
1	Nipple, 1/2 NPTF x 4 in. pipe	X-209-18
2	Elbow, 1/2 NPT pipe	X-215-1
2	Washer, 15/32 x 59/64 x 1/16 in. plain	X-25-34
5	Washer, 9/32 x 5/8 x 1/16 plain	X-25-40
2	Hose	X-312-18
1	Spacer	X-400-201
4	Clamp, 1 in. hose	X-426-10
5	Screw, 1/4-20 x 1	X-465-7
2	Tie, cable	X-468-1
2	Connector, hose	X-582-1
1	Screw, 7/16-14 x 1 1/2	X-6024-3
1	Screw, 7/16-14 x 3/4	X-6024-5
5	Nut, 1/4-20 whiz	X-6210-2
2	Clamp, insulating hose	X-672-3
2	Bushing, reducer	153659
1	Bracket, mounting	275588
2	Plug, freeze	276215
1	Heater, block 120 volt (kits PA-276378, PA-276378-SD)	276691
1	Heater, block 240 volt (kits PA-276379, PA-276379-SD)	276692
1	Tag, hang	279047
1	Shield, heat	326236